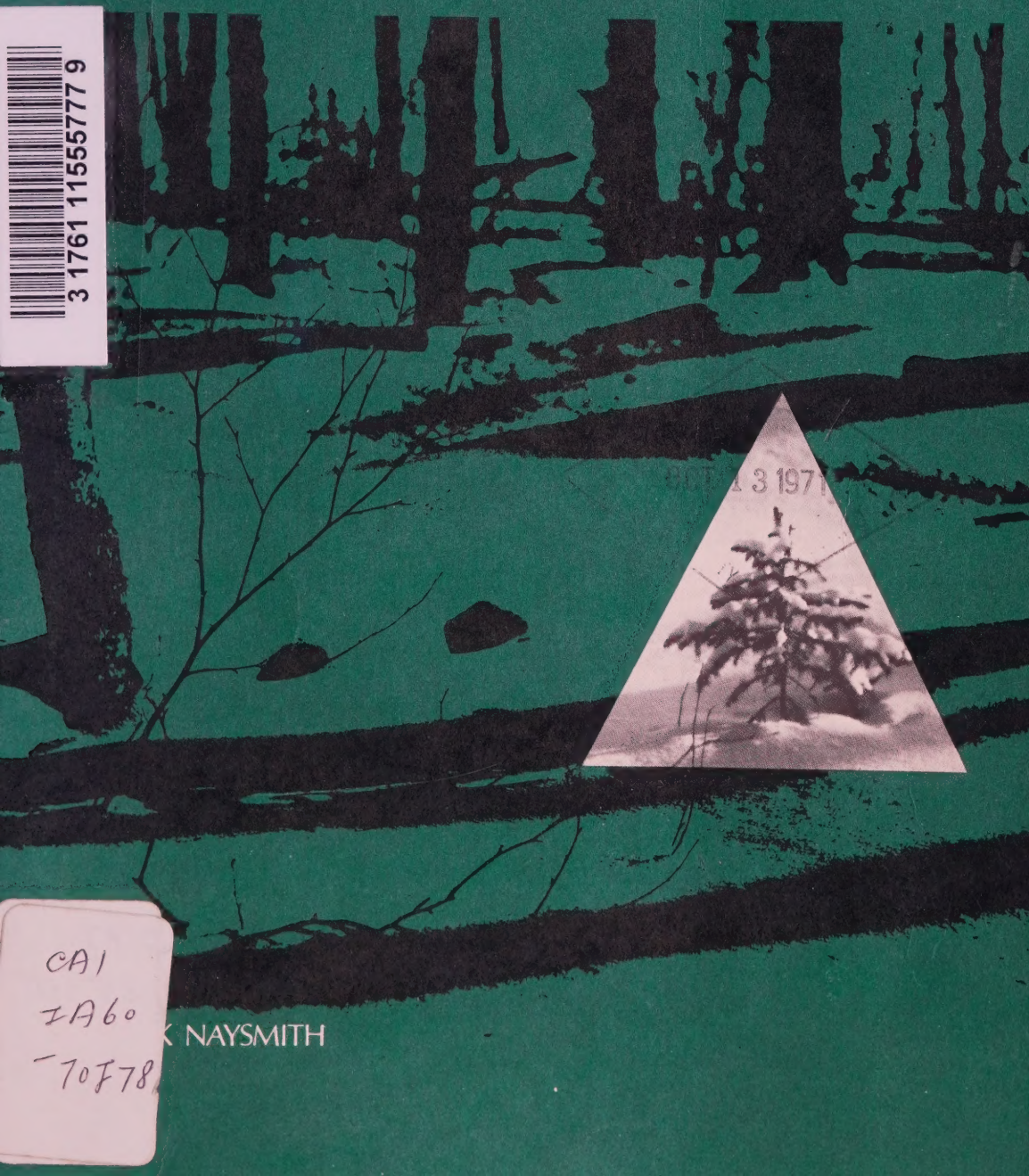


THE FUTURE VALUE OF CANADA'S NORTHERN FORESTS



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Canada
Northern Economic Development Branch

Department of Indian Affairs and Northern Development

Ottawa, January 1970

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FOREWORD

Those responsible for the administration and management of natural resources today must be cognizant of the requirements of all sectors of the community. It is no longer possible to develop a forest-based industry without considering the impact of this development on the natural environment as a whole. The primary objective of the Northern Economic Development Branch, as the name implies, is to encourage the use of our natural resources which are found in the 1.5 million square miles of Canada, north of the provinces.

This paper by Mr. Naysmith, Chief of the Water, Forest and Land Division provides the first of a series being prepared by the Branch on the north's renewable resources. Because it was prepared for the Canadian Institute of Forestry annual meeting in Prince George, B.C., in October 1969, its geographic terms of reference extend beyond the Canadian government's area of responsibility; however, the concepts discussed are applicable irrespective of boundaries.

Recent forecasts have indicated demands upon Canada's forests in the next two to three decades that will require imaginative utilization of available timber. These projections focus attention on an area of Canada formerly considered outside the scope of forest industry. The portion of the boreal forest lying roughly in the 'top third' of the provinces from British Columbia to Quebec, in Labrador and the Territories has become a potential contributor.


Concomitantly, the aesthetic and recreational values inherent in this area are providing an awakened public with another dimension to their concept of Canada; and this country's northern waters will be vital from an international as well as a national standpoint. It is incumbent upon us, therefore, to reflect a balanced relationship between forests, water and wildlife in the specific management principles adopted for Canada's northern forests.

Mr. Naysmith concludes that these various demands can be made compatible with one another and that this virtually untouched frontier region can provide an opportunity for practical modifications in the concepts of use-management.

A.B. Yates

Director,
Northern Economic Development Branch

January 1970.



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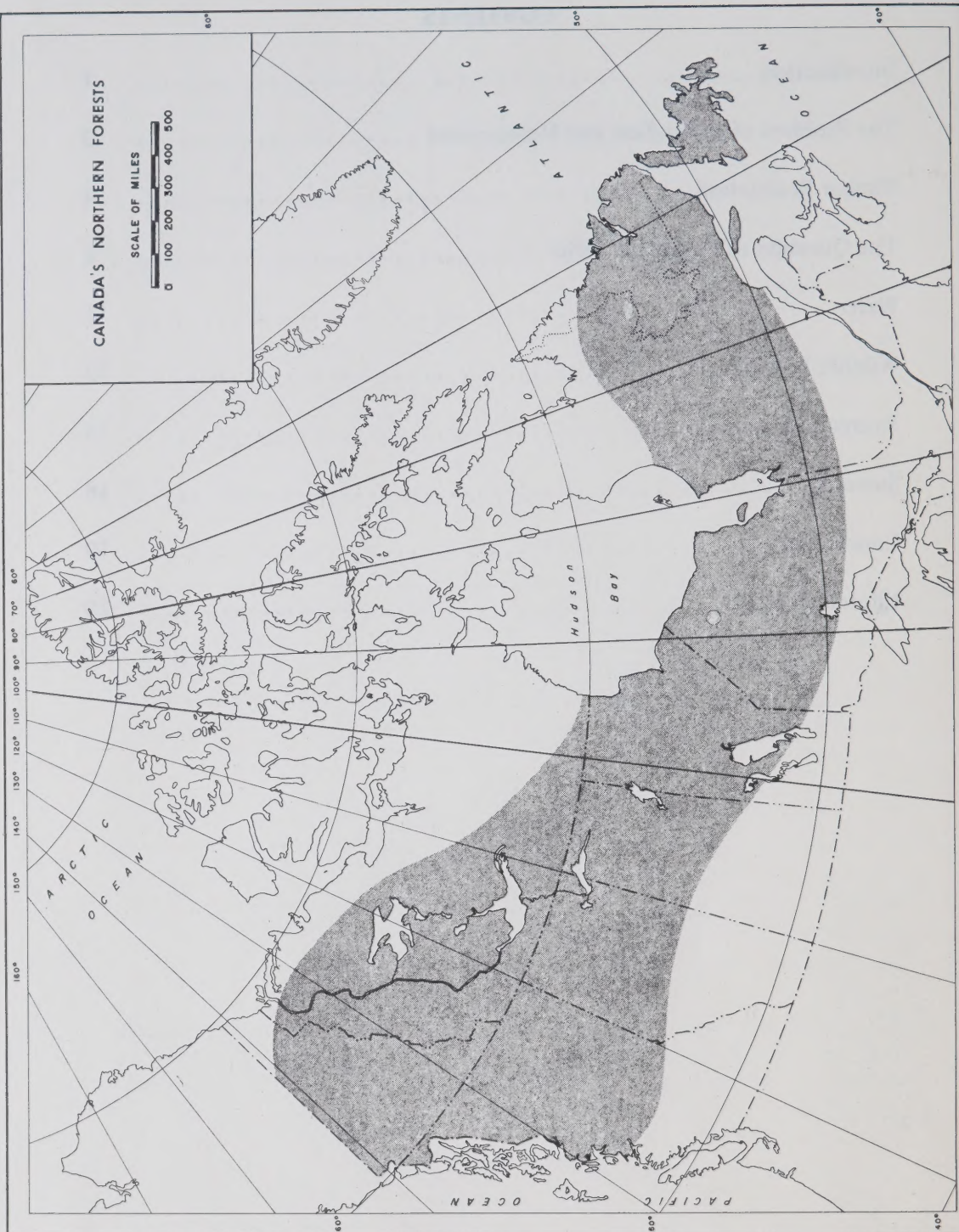
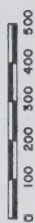
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Photographs by the Author

CANADA'S NORTHERN FORESTS

SCALE OF MILES



INTRODUCTION

Notwithstanding the difficulties inherent in considering the future value of anything these days, the preparation of this paper was an interesting challenge. However, from that time one hundred and fifty years ago when Malthus developed his prophesy concerning the land's ability to support man, forecasters have bitten the dust with unflagging regularity and I entertain no misconceptions about my own fallibility in this contest. Nonetheless, it is a subject which warrants contemplation at this time and I offer these specific observations, which you may say with the Irish butler "may not be the best claret but 'tis the best ye've got! "

For purposes of this paper 'future' is defined generally as the next three to four decades, this due to the fact that most of the current literature and projections refer to that 'magic' year 2000. In some instances where a more qualitative approach is taken, for example with regard to the natural environment and recreational needs, an attempt is made to explore more distant horizons.

On the question of 'value', it seemed advisable to encompass the concept of *forest land* and all that term implies. Here the problems of quantifying the value of a recreational resource, dealt with by Pearse (1968), quickly became evident. Even a cursory search of the literature leads me to agree readily with the late Dr. Walter Jeffrey (1968) when he said, "a major research effort should be made to develop effective economic techniques to quantify and thereby evaluate those resources and benefits which do not yield direct dollar returns."

The term 'northern forest' denotes that portion of the boreal forest region, as classified by Rowe (1959), which lies in roughly the northern third of the provinces from British Columbia to Quebec, plus Labrador, the Yukon and the Northwest Territories.

The question, "Should Canada's northern forests be managed? " implies that an evaluation of the area must be made in terms of the various place and flow demands that will be made upon it. This in itself is a refreshing turn for I believe that, as a profession, we have been frequently criticized in the past for being more interested in trees than in people. It has been said that we have tended to consider the forest as a closed system rather than a single element in a more complex socio-economic system. Gould puts it another way when he says that we tend to start with the resource base and work our way through the system eventually offering a production flow which we hope will satisfy the market; rather than working back from the market to manipulate the resource base in such a way as to satisfy the consumer.

THE PROBLEM OF EVALUATION AND MANAGEMENT

When considering this particular area of Canada, with its relative dearth of social overhead and infrastructure, surely it is more important than ever that we attempt to relate the potential value of the forest to the question of management. If we consider forestry as one element in a larger system, then we are bound to weigh the rate of return from investing in forest management against other forms of investment. This, in turn, leads us to consider the subject of unused forests or idle acres. Recent investigations indicate that by the year 2000 all of Canada's productive forest will be required to meet the demand (Fowler, 1966). Let us assume for the moment that these forecasts are correct. Several alternatives exist for meeting the projected demand:

- a) a more intensive management of existing commercial forests;
- b) a change in logging and conversion practices;
- c) bringing idle lands into operation;
- d) a possible combination of these.

Klemperer (1969) points out that there are a large number of investment alternatives within forestry, the most desirable of which would not always be to bring idle land into production. He continues "many of our unproductive forest lands are areas where associations of well-established plants with little or no commercial value have replaced the original forests. In a number of cases, the forest depletion has become economically irreversible and idleness, as far as commercial wood production is concerned, is justified. Of course, at some later date, changes in technology and price expectations could make a wood production investment economical on the same area. But before this occurs, any forestry investment on an area where forest depletion has passed the critical zone can lead to a mis-allocation of funds." The critical zone referred to is what Ciriacy-Wantrup (1963) defines as the stage in the process of flow resource depletion beyond which halting and reversal of depletion is uneconomical. I suggest that a good deal of our northern forests has reached this critical zone.

Leaving the question of the production of timber for the moment, what about the management of Canada's northern forests in terms of the place demands such as recreation, wildlife and watershed control? Whereas with the earlier question of timber production the future meant the next thirty years, with this broader question we push our time-horizon much further ahead at the same time considering the effect on the resource-base of population growth at exponential rates. Although the multiple-use concept in North America apparently dates back to a letter of instruction which Pinchot received from U.S. Secretary of Agriculture Wilson in 1905, (Dana, 1958), its practical application generates no little difficulty today, sixty-five years later.

It has been said that the terms ‘primary-use’ and ‘secondary-use’ have undesirable connotations because they tend to establish a value judgement as a perpetual and immutable fact (Jeffrey et al 1969). However, I believe that for the concept to function at all, multiple-use must consider one product central to the others. Which one gets the nod? How much recreation, wildlife, wood or high-quality water do we want and what is the order of importance? Herein lies the rub. How do we compare material and aesthetic values for example and how do we determine the extent to which public funds should be committed in order to realize future benefits. The difficulty of course stems from the fact that we are attempting to compare the benefits of different products, only some of which flow through the market system. Gould describes the problem as “one in which foresters must realize that they can no longer logically expect to analyze facts and find concrete final and total policy solutions. Instead,” he claims, “they can define relevant alternatives, analyze probable ranges of results, and sharpen up the residual uncertainties that will affect final decisions.”

Surely one way to lift a corner is to start with a phase that does move through the market place – namely the production of wood.

TIMBER PRODUCTION

In the preparation of this paper, I conferred with representatives in each of the provinces having forests within the defined area. It appears that the whole region could furnish roughly 1.6 billion cubic feet of usable timber annually. This figure compares fairly well with Wilson's (1966) 1.5 to 1.9 billion cubic feet for approximately the same area. On the question of timing, comments ranged from, "due to lack of access it is highly unlikely that much of this province's northern forests will be used in the foreseeable future," to, "we expect a large portion of the timber in the northern third of the province to be utilized before the end of the century." More than once it was pointed out that a good deal of the allowable cut in the area now under production is not being used and that it would be safe to assume that this will be utilized before new areas, i.e. northern forests, come into production.

The picture for the region as a whole is:

- a) expansion of the forest products industry into the 'northern forests' during the next two to three decades seems inevitable,
- b) the possibility seems remote that full utilization of the allowable-cut will be realized by the end of the century,
- c) that, considering changes in technology, levels of management intensity and product substitution, it is questionable when, if ever, the total allowable cut will be absorbed.

It is on the last two points that the present consensus differs most from the 1966 National Forestry Conference findings. At that time it was indicated that all of Canada's forests, which Wilson estimated could provide 12 billion cubic feet annually, would be required by the year 2000. Accordingly, the allowable-cut of 1.6 billion cubic feet annually for the northern forests would be absorbed during the last decade of this century (See Fig. 1).

Volume figures alone mean very little, but they can be used to measure the economic impact of converting volumes of timber to forest products. The 1969 study (Ontario, 1969), prepared for the Ontario Department of Lands and Forests, on the forest industry in Ontario, was used as a basis for projecting the impact of developing Canada's northern forests.

To do this, two things were assumed:

- a) that by the year 2000 only two-thirds, or 1.1 billion cubic feet of the indicated total allowable-cut in Canada's northern forests will be utilized; the balance not being available due to low volumes per acre, lack of access and changing technology which will increase the productive capacity of more favourable regions, and
- b) the 1.1 billion cubic feet harvested annually will be converted to pulp and paper.



THE ROLE OF THE NORTHERN FORESTS WITH RESPECT TO TOTAL CANADIAN SUPPLY AND DEMAND

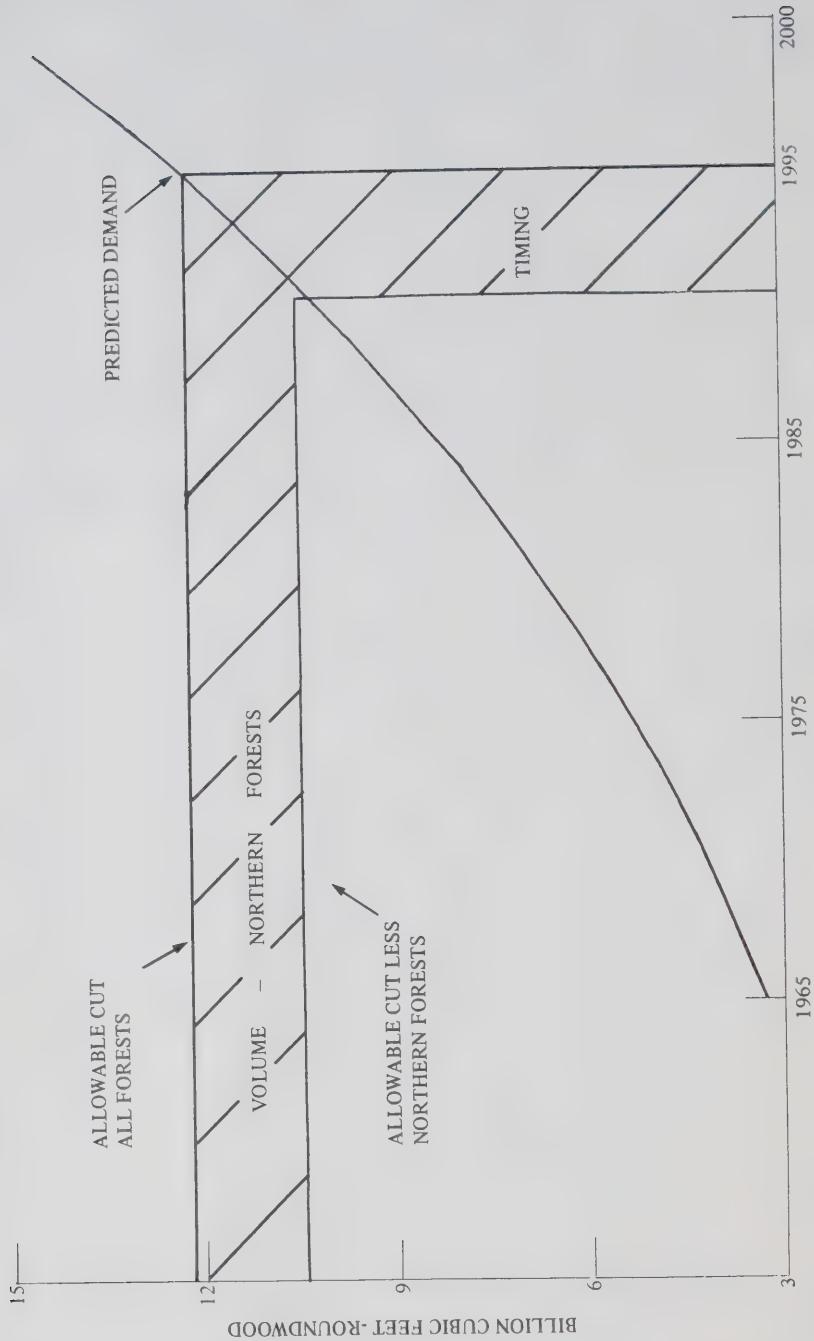


FIGURE 1

Based on Ontario's experience, and the assumptions just cited, the industrial development of the northern forests could provide 58,000 new jobs within the industry. This figure includes a reduction by 90 per cent in the logging labour force from what would be required today, based on Nielson's (1969) prediction that within one decade the woodlands' labour force in eastern Canada will be reduced by 50-80 per cent due to increase in the use of harvesting machines.

The Ontario study suggests an employment multiplier for relatively isolated forest-based communities to be between 2.01 and 2.13. On this basis, an additional 60,000 jobs would be provided within the forest-based communities which would not be directly associated with the industry.

These employment figures represent the equivalent of approximately twenty-five to thirty new communities with all that implies in terms of social overhead and infrastructure, plus an annual personal income figure of approximately \$700 million.

The foregoing has been an attempt to sharpen our perspective regarding the future economic value of the timber in our northern forests and heed Pearse's (1967) warning that, "a preoccupation with volumes, irrespective of values, results in a misallocation of public resources." The whole question of forest regulation now rises before us engulfed in awesome obscurity. What form of regulation and with what objectives? What about sustained-yield? Since it is a new park, do the ground rules change? The flood of questions does nothing to facilitate a knowledgeable response.

THE QUESTION OF SUSTAINED YIELD

Although I am aware that the question of sustained-yield, per se, is outside the purview of this paper, it does not appear proper to omit it entirely from my comments; probably no single concept in forest management is under closer scrutiny today and, I suggest, with good reason. It seems somewhat incongruous, considering that we have just shared in the experience of a moon-walk, to be discussing, still, the ramifications of the sustained-yield principle the genesis of which coincides with the first flight 60 years ago of a gasoline motor-driven aircraft.

On the question of forest-regulation, Smith (1965) cites what he calls three basic determinants of allowable cut:

- a) the availability of markets in which the products can be sold at a fair price;
- b) the relative value of logging timber now in comparison with logging it at some time in the future; and
- c) the number of years required to grow a merchantable crop on the logged lands.

This approach seems particularly appropriate to Canada's northern forests. It would seem advisable to remain clear of sub-marginal areas but maintain the potential for economic development by increasing the annual cut in the more productive areas, i.e. beyond the sustained-yield level as determined by 'good' forest management. I suggest therefore that the rate of cutting in the northern forests should be determined more on the basis of market demand than silvicultural constraints.

In discussing the question of sustained-yield, the literature is fraught with phrases such as, "the appropriate rotation", (appropriate in terms of what?) or statements such as "an annual cut sufficient to remove all over-mature and mature timber would create large areas of understocked or young-growth forests—which might lead fifty years from now to a forced reduction in production." Fifty years in terms of technical innovations is a long time.

Almost 100 years ago, in 1873, the American Association for the Advancement of Science heard a paper by Franklin B. Hough, one of the fathers of American forestry, "On the Duty of Governments in the Preservation of Forests." Motivated by a fear of a future timber famine, the Association in turn informed Congress and the several State legislatures of the importance of promoting the cultivation of timber and the preserving of forests (Dana, 1958). As recently as March of this year, the Chief of the U.S. Forest Service, Edward P. Cliff told the housing sub-committee of the Senate

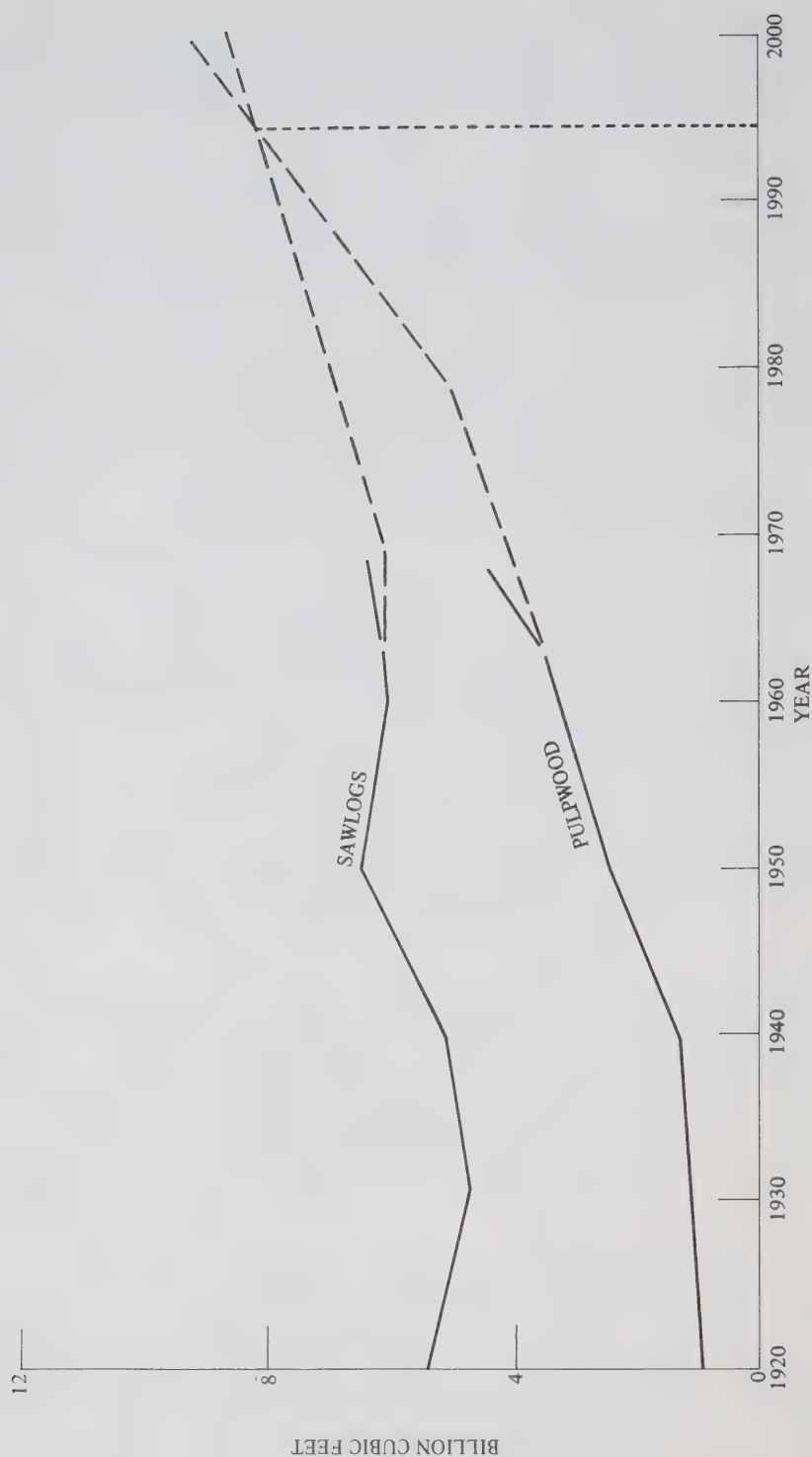
House Committee on Banking and Currency, that the allowable harvest rates on the national forests could be increased by 66 per cent if the Forest Service had assurances of long-term financing for new roads and intensive forest management.

Projections of the consumption of roundwood in the United States to the year 2000 show that some time during the last decade of the century, the pulpwood requirement will surpass the saw-log requirement for the first time in history. (See Figure 2).

If this is indicative of a shift in the specifications of a usable tree then perhaps we, in turn, should be prepared to shift our emphasis from the dimensions of an individual tree to the volume of wood fibre per acre. It is quite possible that those high volume, many stems per acre, young-growth forests will be the life-blood of the forest products industry.

In essence then for much of our northern forests we should avoid sub-marginal areas and encourage the industrial utilization of the more productive stands by increasing the cutting rate beyond the level dictated by silviculturally based sustained yields.

U.S.A. CONSUMPTION OF ROUNDWOOD



U.S.F.S. FOREST RESOURCE REPORT NO. 17-1965
& MISC. PUBLICATION 1969

FIGURE 2

WATER

What of the other side of the coin, that is, the realm of the conservationist? What effect would such a policy have on future generations in terms of the other benefits derived from forest land, for example, recreation and watershed management? It is this element of concern to which Jeffrey (1968) referred when he said, "the danger is that for short-term economic advantage, we sacrifice long-term social benefits; that in rapidly developing an economically-desirable industrial base, we jeopardize a socially-desirable base."

In the long run, the abundant supply of high quality water will probably prove to be northern Canada's most valuable renewable resource. Already proposals are being made by our neighbours with regard to the diversion of water, although it has been made abundantly clear that until such time as Canada's own requirements and inventories are clearly known, no water will be diverted southward. The solution to this question may be many years away, but it is obvious that the ultimate importance of these waters is already recognized.

In addition to the potential for water export, there are growing demands on northern water resources for use within the regions themselves. For example, the Mackenzie system has been used as the major transportation route to the western Arctic for years and this route will be an expanding one as regional development increases. Similarly, with respect to hydro-power the Yukon River has a tremendous potential for development which could result in an almost unlimited supply of low-cost power for northern B.C., the southern Yukon and a large part of Alaska.

The interaction of forest harvesting and water management seems to be fairly well understood. There is considerable empirical evidence to suggest that the removal of timber will increase water yield, although to what degree remains unpredictable. Most research to date has been done in areas where water shortages occurred, with the increased yield proving beneficial. On the other hand, lack of foresight could result in increased water yields which would prove detrimental. Although water from undisturbed forested watersheds is typically of high quality, forest harvesting may impair this quality. Jeffrey did provide some encouragement when he stated that although timber harvesting may have a deleterious effect on water resources both in terms of yields and quality, wise forest management can mitigate such effects. In view of this, the future value of the water resources in Canada's north leaves no alternative but to manage the forests wisely.



WILDLIFE HABITAT

Wildlife habitat is another inherent value of the northern forest which is subject to change by the introduction of forest industry. The problem of attempting to evaluate a forest as wildlife habitat seems to be compounded by the fact that there appears to have been little success to date in evaluating the wildlife resource itself.

The literature indicates that most wildlife research has been done with reference to a particular animal and its habitat. It is becoming apparent that this research base needs to be broadened if the relationship which exists between all segments of the forest community is to be clearly understood.

For example, the effect on the fauna of disturbing the forest cover or altering the pattern of stream-flow, is of particular importance where the local economy is based on trapping, such as Old Crow in the Yukon Territory or the Mackenzie Delta of the Northwest Territories. In such instances, major modification in the balance between forest cover, water, and wildlife may have considerable effect on the local population's traditional means of livelihood.

Where no significant trapping economy exists the impact is not so evident, nevertheless changes do occur. For example, there is considerable empirical evidence to the effect that a logged-over climax forest will increase its capacity to maintain a moose population. However, Novakowski points out that, in some cases, alteration of the environment tends to act as a population suppressant rather than a release, as in the case of animals particularly suited to living off the arboreal lichens in the climax forest.

Throughout the extent of the boreal forest region from Newfoundland to the Yukon Territory, big-game hunting is considered to be a significant source of revenue. For this reason, management practices should reflect the importance of the wildlife habitat within the forest regime. In a case which may be unique in Canada, a forested area is being protected from fire for the sole purpose of preserving the wildlife habitat.

In 1966, the Northern Economic Development Branch, at the request of the Canadian Wildlife Service, undertook a program of protecting from wild-fire that portion of the barren-ground caribou range lying southeast of Great Slave Lake. This area, covering approximately 30,000 square miles, contains virtually no merchantable timber but is the winter feeding ground of the 160,000 caribou known as the Beverly Herd. The Caribou-Range Protection Unit of the Mackenzie Forest Service was established and consists of reconnaissance aircraft, water bombers and ground forces. Over the past four years, it has fought and extinguished over 60 wildfires in the caribou range.

RECREATION

With respect to the recreation potential of the region, the consensus seemed to be that fly-in fishermen and hunters will continue to be the prime users of the provinces' northern forests for some time to come. All agreed that the region had considerable potential for recreationists, but the lack of access and facilities will prevent all but the affluent and the hardy from enjoying it. The attraction of the north to sports fishermen and hunters, (and I refer here specifically to the far north), should not be underestimated. For example, in 1968 of the 9,000 tourists who visited the Northwest Territories, nearly 4,000 made direct flights to Territorial fishing lodges from points in the provinces, (N.W.T. 1968).

It was generally agreed that concentrated use of the northern forests for recreational purposes in the future would be directly related to the development of a road net. The Yukon's experience tends to corroborate this point. Compared to the 9,000 tourist visitors to the Northwest Territories in 1968, the Yukon Territory, which has a relatively well-developed road system, was visited by more than 100,000 tourists in the same year. This figure suffers in comparison with the provinces, but in light of the fact that it is equivalent to seven times the local population, it must be considered significant.

It seems reasonable to assume that as road systems are developed through northern Canada the need for parks and camping facilities will quickly follow. With the available time and money for outdoor recreation and tourism increasing, the opportunity to explore frontier areas will require an expansion of provincial park systems and roadside campgrounds. Because of the scattered nature of the merchantable timber stands in much of the northern forests, it is safe to say that a significant portion of the road net will traverse areas of limited value in terms of industrial utilization. As a result, we may have fairly extensive and accessible areas where the forest cover is more valuable to the recreationist than it is to the woods industry. Conversely, in terms of economic benefits to a particular area, the production of the forest in terms of recreation potential may be significantly more valuable than the production of timber. Such situations already exist. In the Pisagh National Forest in the Appalachian Region the value of timber products sold in 1964 was less than \$200,000 while, at the same time, over 3 million recreation visits were recorded, (Knetsch 1967).

I referred early in this paper to Pearse's study of the problem of evaluating non-priced recreational resources. Presumably, one of the reasons we choose to make such an evaluation is to compare the projected return accruing from the investment of public funds in conflicting uses of the



resource base. It appears that because of the particular configuration of much of the northern forests, the problem of choosing the primary-use in an integrated resource program will prove less bothersome than measuring the degree to which funds should be invested in exploiting that use.

Olson (1958) warns us of the danger of becoming preoccupied with the economic implications of recreation areas, and conservation generally, and reprimands those who see them only as graphs, statistics, national income and expenditures. On the other hand, in Galbraith's, (Sears, 1958) discussion of natural resources he claims that conservationists insist on retaining beauty in inverse ratio to the number who can enjoy it. If we use these two views as points of reference we have a fairly broad base from which to discuss the subject of wilderness parks.

A good deal has been said on this subject since the passing of the U.S. National Wilderness Preservation Act in 1964, and much of the discussion, at least in Canada, seems to have centered upon the question of what constitutes a wilderness area. Hughes (1968) refers to "institutional wilderness" and suggests it is a legally designated area with a distinctive name, definite boundaries and a plan for its management. Such an area, he continues, is generally characterized by its large size, remoteness from cities and people, ruggedness of terrain, lack of development (particularly roads) and some unique topographic or vegetative feature.

Using these terms of reference for designating wilderness areas in Canada, I suggest that our northern forests could provide us with an abundant choice. The question becomes not "where?" but "how much?" Landsberg (1962) suggests that the 14 million acres of primitive, roadless wilderness and wild areas set aside in the U.S. national forests in 1964 will have to be increased to 43 million by 1980 and 100 million by 2000. Proportionately, the figure for Canada by the end of the century might be roughly 10 million acres or 16,000 square miles. This represents an area of less than 2,000 square miles for each territory and province included in the northern forest region.

Projections of recreational needs are fraught with pitfalls such as the confusion of demand with consumption. As Knetsch (1967) points out in his discussion of the problem of projecting recreation requirements, different levels of supply generate different levels of consumption. This could lead, in our case, to erroneous comparisons between Canadian and U.S. recreation demands. In addition to the purely mechanical problems inherent in such predictions, there is the more philosophical consideration of the degree to which wilderness areas will be valuable to future generations. Lowenthal in discussing the public attitude on this question says, "wilderness pilgrimages are sometimes seen as redemptive journeys into innocence and aboriginal

virtue. But millions mostly prefer intensely gregarious and comfortable outdoor activity, the call of the wild being satisfied vicariously by throwing symbolic water on a campfire as the park ranger turns off the gas jet." Although presented waggishly, the comment is fair and it behooves us during the planning process to be cognizant of its implications. It is difficult to answer the fellow who says "what has posterity ever done for me?" nevertheless I am one who would heartily endorse the concept of wilderness sites in the northern forest region.

SUMMARY

The question of managing Canada's northern forest must be approached very realistically. If it is to support a significant segment of future forest industry it will have to do so under a different set of rules. Many of the concepts acceptable "down here" today won't be acceptable "up there" tomorrow.

In the north, the value of the forest in terms of watershed management, outdoor recreation and wildlife habitat will be in many instances equal to or greater than its value as a source of timber.

Due to such factors as product substitution, shifts to regions of faster growth and increased forest management in more accessible areas, the timber value of Canada's northern forests will probably remain marginal. In order to gain full advantage of the situation, it will be necessary to regulate the rate of cutting, more to market demand than to silvicultural constraints. That is, if we are preoccupied with rotation age and annual increment, we may reduce the allowable cut to a level which makes the area economically inoperable or at best, makes it so uninteresting to the private investor that we miss even one good kick at the cat.

We may have to revise fire-protection objectives. Due to the vastness of the area, it may be necessary to establish well-defined protected and non-protected zones. Because of the other values referred to earlier, particular areas may be protected primarily or solely for values other than timber.

The scattered nature of the stands in some of the northern forests precludes industrial utilization but conversely provides a good deal of latitude for non-conflicting outdoor recreation. The value of the northern forests in terms of wilderness sites and natural areas should be recognized.

The increasing importance of high quality water and the major volumes which flow through Canada's northern forests make it incumbent on us to reflect this in the specific management principles we adopt.

CONCLUSION

The area we have been considering has a future but no past. It provides the opportunity for planning and necessitates no patching. Historically, much of our natural resource policy has resulted from crisis situation: anticipation of timber shortages precipitating forest management; flood control legislation following rampaging flood waters; pollution control in the aftermath of oil-soaked beaches.

Canada's northern forests represent a vast resource base with a clean slate. If we recognize that technology has widened our spectrum of choice and provided certain room to manoeuvre, we will not be found wanting by a sensitive public which no longer finds acceptable single solutions to resource-use problems.

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